"Android Based Mobile Application City Map"

Sandip Bailkar, Abhijit Malakolikar, Swapnil Sonawane, Sandeep Hadole, Harshada Patil

***Abstract* -Nowadays Smartphone's becomes a part of human life and everyone uses it, because Android makes use of Smartphone easier and familiar. As a transportation or tourism point of view there are many applications are available, but all this applications having some drawbacks in case of functionalities and efficiency. Here this application provides all the functionalities whichever user needed, at a single place. Such as Real time object tracking, schedules of buses, Available routes, Bus stops with its attributes, Emergency help, Information about surroundings. The developed System uses client-server architecture. At a client side there is a android Smartphone with this application and on the other hand there is server side with processing unit which processes on the input data and send output to client. To determine current location and object tracking GPS and Google API's were used. By giving source and destination as an input user can access other functionalities.**

***Index Terms*— Android, Automatic Transit tracking, GPS, Google Map and Google Place API, ITS, Map Matching Algorithm, Open Source, RC6.**

I. INTRODUCTION

Today's world is world of Smartphone's. Mobile is used by everyone in day to day activity. Growth of mobile phone technology increased drastically. Mobile has changed our lives and has become part of it. Now they are not used for just for making call back they have innumerable uses. Operating system is very important to operate Smartphone. The Mobile without operating system is just like nothing. One of the most widely used mobile operating system these day is Android. Android does a software bunch comprise not only operating system but also middleware and key applications. Android is a powerful operating system supporting a large number of application in Smartphone's. These applications makes life more comfortable and it provide very user friendly features to user. Android is developed by Google.

Android is available as open source for developer to develop application which can be further used for selling in android market. Open source software is software that can be freely used, changed, and shared by everyone. Open source software is made by many people and distributed under license that complies with the open source definition. The developed system is android based application, it is very user friendly and anyone can use this application easily. The City Map is Smartphone application for the user who are unknown in the city. They can use city map application to know information about the city and cities nearest bus stop from the users current location and they able to search closest bus stop with the attribute such as bus stop location ,popular building on the route, different path to reach the same location with the minimum distance, and other useful information. The user will be able to access all the information they want from the City Map. The application used as smart user guide while travelling also can be used as informative application i.e. information regarding to route, distance and travelling techniques available can be found out while travelling from one place to another. The application can be of great help when user is in unknown region. The place API used will be running in background which will inform about surrounding.

The Developed system provides two options for the guest as well as the permanent user of the application. The users have required registering with the application with correct information and system will provide security to information. To the Guest, System will be just for finding the location on the map they want and guest easily can reach the destination as they wish. The System is developed on the popular platform so user can easily use City Map application. Google map and Google place are the application programme interface (API) used for the design the digital road network for the mobile device, so user of City map can easily locate the location by its current location on the map. To know current location Global Positioning System (GPS) is very useful. The GPS is a satellite based navigation system made up of network of 24 satellites placed into orbit by the U.S. Department of Defence. Military application is main intended of the GPS but Government made the system available for the country people. GPS works anywhere in the world, in any weather condition, 24 hours a day. It is free of cost, no subscription fees or setup charges to use the GPS. The receiver uses delay lock loops to correlate incoming sequence are Gold codes formed as product of pseudorandom noise sequences.

By aligning the received and locally generated codes, the receiver determines the pseudo range to each satellite. When the measurement is made the receiver clock time is compared to the satellite time of transmission to determine the pseudo range. The satellite time of transmission is encoded onto the bit sequence using the navigation data. GPS is constellation of 24 satellites that provides users with continuous, worldwide positing capability using the data transmitted in the GPS navigation message.

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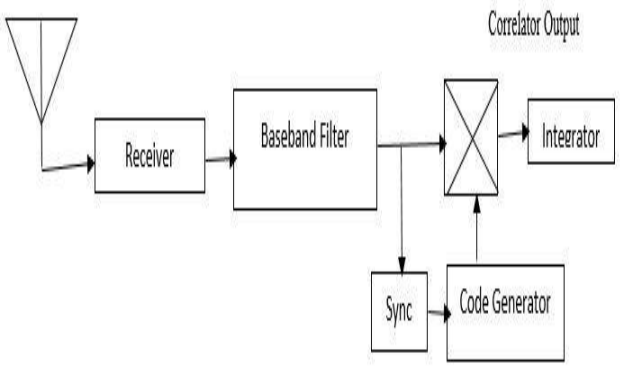

Figure 1. GPS Receiving System

The developed system is based on client server model. Client consist the mobile, City Map application and server consist route builder, monitoring application and database. GPS provide current location on map. Route builder used as build the route on the digital map and it uses the map matching algorithm. Database used as store all the bus stop attribute and users required information. Use of monitoring application is monitoring the user's behaviour with the system and it provide powerful security to the application. This document is organized as follows: Section II describes the previous work in the field, Section III describes the architecture of City Map; Section IV Describe the evaluation performed and finally, Section V shows conclusion.

II. RELATED WORK

The existing GBUS-Route GeoTracer is one of the application of Intelligent Transportation System (ITS) and application of Information technology to the transport network to improve safety, productivity, accessibility and mobility. ITS used by almost public or private transportation company. ITS handles the large database related to the transportation company. GBUS-Route GeoTracer expands XtraN Passenger, it is a system to automatically collect bus route and to collect bus stop location and attribute. In GBUS when user collects route in running vehicle, the mobile application periodically capture the vehicles location, provided by the devices Global Positioning System. GPS sensors are imprecise and the location obtained usually deviate from the actual locations of the user. The route builder server analyses the data received and applies a map matching algorithm to map the collected GPS points onto the road network. The server is also capable of identifying common stretches among the several routes, facilitating route optimization. All the information then stored in database. The server side also includes of back office monitoring application to visualize and edit all the information before it integrated into XtraN Passenger. The another existing system is easy tracker to trace the current location of user which is designed to provide transit tracking, mapping, and arrival time prediction services with reduced costs and complexity. The main function of existing tracking system is to periodically send the GPS coordinates of its actual position, creating GPS traces. These traces are then analysed in order to produce route shapes, determine stop location, and schedules. Smartphone based system which we call Easy Tracker. To use Easy Tracker, a transit agency must obtain Smartphone's, install an application and place a phone in each transit vehicle. Level of automation is possible through a set of algorithms that use GPS traces collected from instrumented transit vehicle to determine routes served, locate stops, and infer schedules. In addition, online algorithms automatically determine the route served by given vehicle at a given time and predict its arrival time at upcoming stops. The disadvantages of easy tracker are impossibility of defining attributes to bus stops, since the entire process is automated. Map matching is the process of correlating positioning data with spatial road network data in order to identify the correct road on which a vehicle is travelling. This process is required due to the error associated with positioning sensors. Map matching algorithm i.e. point-to-point, point-to-curve, and curve-to-curve matching algorithms uses the geometric information and uses also the topological information. Geometric map matching algorithms only make use of geometric information for the road network. Topological algorithms combine geometric information with topology of road segment, to match each collected point. It provides significant better result than the geometric algorithms. In probabilistic map matching algorithms a confidence region is defined around a position obtained from navigation sensor. Advanced map matching algorithms are those that use more refined concept such as fuzzy logic, Kalman Filter, Dempster-Shafers theory of evidence, Particle Filter, multiple hypothesis Technique and an Interacting Multiple Model.

III. ARCHITECTURE

City Map is android based application uses the client side as well as server side. An overview of its architecture is shown in figure 2. The client side consist Smartphone with installed application, GPS and server side consist the route builder, back office monitoring, database.

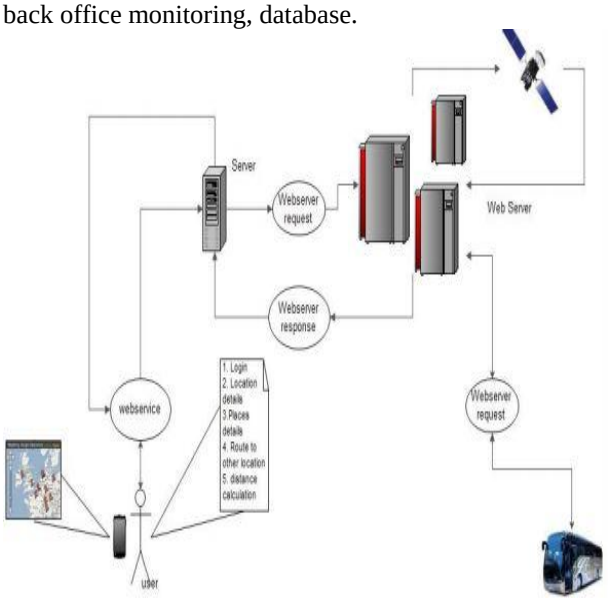

Figure 2. Architecture Overview of City Map

A. *Client Side*

The user side also known as client side. Client side consist the mobile, City map application, GPS and the user of the developed system. The mobile should supports the android

operating system and City map application must have installed on the Smartphone device. GPS should be enabled on device so it provides the current location of user on the map and it show the location with the attribute to user. Before actually use of application , user have to registered to City Map application with the correct information and then login to system , whenever they want and user can access the all useful information from application that user looking for. The client request for the nearest bus stop, then GPS will provide the current location and City Map application will show the nearest bus stop with the attribute such as photo, useful information and important building on the road. City map application also provides the different route to the same location and provide minimum distance route to reach the destination. Web server is server part used to process the users request and provide the information that user want from the application. A route comprises a set of bus stops and path, which in turn corresponds to sequence of GPS locations. During the collection of route, the application accesses the devices GPS to periodically collect the location of the user.

B. Server Side

Server side include the database, route builder, and back office monitoring. Route Builder used for building the digital route network for Smartphone. The main purpose of the route builder is to apply map matching algorithm to the GPS traces received from the mobile application. The monitoring application server provides a monitoring web application which allows the user to visualize all collected routes and bus stops. In order to display information, the monitoring application accesses the information in the database which was stored by route builder. Web server is also powerful component of server side. Web server maintains the web pages on the server side. The developed system uses the Google location API and Google place API. Using the Google Maps API, it is possible to embed Google maps site into an external website, on to which site specific data can be overlaid. Server side is very important to run the City Map application correctly. All the processing will be done at server side. Google APIs is a set of JavaScript APIs developed by Google that allows interaction with Google Services and integration of rich multimedia, search or feed-based internet content into web applications. They extensively use AJAX scripting and can be easily loaded using Google Loader. Google Loader (or Google AJAX APIs Loader) is JavaScript API which allows web developer to easily load other JavaScript APIs provided by the Google and other developers of popular libraries. Google Loader provides a JavaScript methods for loading a specific API (also called Module), in which additional setting can be specified such as API version, language, location, selected packages, load callback and other parameters specific to a particular API. Dynamic loading or auto loading is also supported to enhance the performance of the application using the loaded APIs.

IV. EVALUATION

Tests were performed in order to verify the accuracy and precision of City Map application. Evaluation of developed system makes test data which further used for identify the loop holes in the City Map Application. To execute the map matching algorithms, geographic road data is required, that is, information about roads and points on the map. To show map or digital map network for devices Google Map and Google Place API integrated in the system. GPS show the current position of user and system helps to user to find the location, location address specification, Geo positioning and support value mapping. The RC6 is great security mechanism used for provide security to database. RC6 is a symmetric key block cipher designed from RP5. RC6 encryption gives the security to data storage. SPEKE used for generating encrypted random password. The developed system provides great security to user data. In figure 3 Client have to login City Map application and server receive the authentication request and check the valid user in the database and provide the current location of user and nearest location that user want. Main task in network is process and calculate latest location updates, place updates and send response to server.

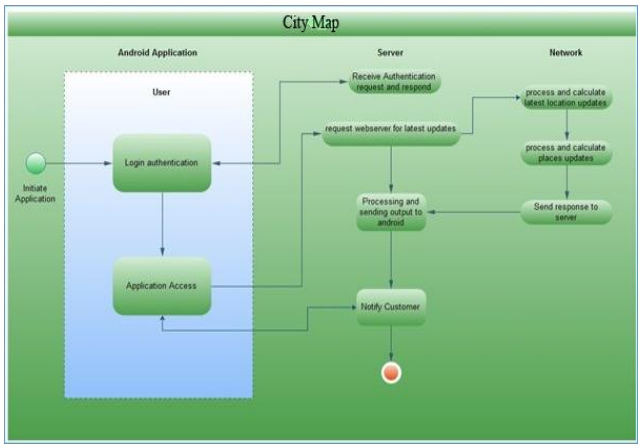

Figure 3. Client and Server Side Process

V. CONCLUSION

City Map application is android based and user friendly. The developed system enables the collection of bus stops location and the other useful attribute. At the same time user enables to see current location on the map, different route to same location, and the minimum distance to reach destination. Google location and Google place API will help to user to find the correct location on the digital map network. Google place shows the required place. GPS is also very important to show current location of user. The database at server side will maintain the number of users information and it also provide the great security to users authentication process. City map makes use of a set of existing technique such as RC6 security mechanism, Google location and Google place API, map matching, in order to provide high accuracy, security, and precision, with one touch Smartphone application. The developed system maintains geographical, topological data at database and provides user friendly environment application to the user.

VI. RESULT SET

City Map provides various functionalities to the user of application such as available route to the destination, schedules of buses, attributes of bus stop i.e. location, stops, timing and etc. Another important functionality is any user

can suggest new route and that can be added in the app after verified by the administrator. Developed system uses the Application program Interface (API) such as Google Matrix and Goole place and it is very useful to build the digital map for the device. GPS that provide current user position on the road and can navigate to the surrounding location. The purpose of system to display the nearest hospitals, police station, Government Buildings and other important surroundings with their information. There is another special functionality is provided which can be used in emergency situations as a help. This System improves productivity, accessibility and mobility.

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